

WHAT IS CLAIMED IS:

1. A warning apparatus for a vehicle, comprising:

5 a contact possibility warning unit configured to determine a contact possibility of the vehicle contacting with an object that is present in front of the vehicle according to relative motion between the vehicle and the front object, the contact possibility warning unit providing a contact possibility warning by changing at least one of the driving force and the braking force of the vehicle according to the contact possibility;

10 a driver intention detector configured to detect a driving intention of a driver of the vehicle, the driver intention detector detecting at least a driving intention of the driver that the driver is driving the vehicle in recognition that the possibility of the vehicle contacting the front object is increasing; and

15 a warning controller configured to change the timing of providing the contact possibility warning according to a detection result provided by the driver intention detector.

2. The warning apparatus of claim 1, wherein:

the driving intention is that the driver intentionally brings the vehicle closer to the front object when the vehicle is driven in a steady state.

20 3. The warning apparatus of claim 2, wherein:

the driver intention detector detects a lane change of the vehicle as the intention of the driver in intentionally bringing the vehicle closer to the front object.

4. The warning apparatus of claim 2, wherein:

25 the driver intention detector delays the timing of providing the contact possibility warning in a case where the front object is in a lane to which the vehicle is going to change its lane.

5. The warning apparatus of claim 1, wherein:

30 in a case where the driver intention detector detects that the driver is intentionally

bringing the vehicle closer to the front object with the vehicle in a steady driving state, the warning controller reduces a control value to change the driving torque or braking torque.

6. The warning apparatus of claim 2, wherein:

5 in a case where the driver intention detector detects that the driver is intentionally bringing the vehicle closer to the front object with the vehicle in a steady driving state, the warning controller reduces a control value to change the driving torque or braking torque.

7. The warning apparatus of claim 1, wherein:

10 the relative motion includes a relative speed between the vehicle and the front object;
and

 in a case where the driver intention detector detects that the driver is intentionally bringing the vehicle closer to the front object with the vehicle being in a steady driving state, the warning controller changes a control value of at least one of the driving torque and braking
15 torque according to the relative speed.

8. The warning apparatus of claims 1, wherein the warning controller releases the change made by the warning after a predetermined time.

20 9. The warning apparatus of claims 2, wherein the warning controller releases the change made by the warning after a predetermined time.

10. The warning apparatus of claims 3, wherein the warning controller releases the change made by the warning after a predetermined time.

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11. The warning apparatus of claims 4, wherein the warning controller releases the change made by the warning after a predetermined time.

12. The warning apparatus of claims 5, wherein the warning controller releases the change
30 made by the warning after a predetermined time.

13. The warning apparatus of claims 6, wherein the warning controller releases the change made by the warning after a predetermined time.

5 14. The warning apparatus of claims 7, wherein the warning controller releases the change made by the warning after a predetermined time.

15. The warning apparatus of claim 1, wherein:

the contact possibility warning unit determines a contact possibility by comparing a
10 first time derived by dividing a relative distance between the vehicle and the front object by a speed of the vehicle with a first threshold and provides a contact possibility warning under a first control condition according to the determined contact possibility; and

the warning controller delays the timing of providing the warning by changing the first threshold.

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16. The warning apparatus of claim 15, wherein:

the driving intention is determined as being that the driver intentionally brings the vehicle closer to the front object with the vehicle being driven under a steady state; and

the warning controller reduces a control value to change the driving force or braking
20 force by changing the first control condition.

17. The warning apparatus of claim 1, wherein:

the contact possibility warning unit determines a contact possibility by comparing a
second time derived by dividing a relative distance between the vehicle and the front object by a
25 relative speed between the vehicle and the front object with a second threshold and provides a contact possibility warning under a second control condition according to the determined contact possibility; and

the warning controller reduces a control value to change the driving force or braking force by changing the second threshold.

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18. A warning apparatus for a vehicle, comprising:

contact possibility warning means for determining a contact possibility of the vehicle contacting with an object that is present in front of the vehicle according to relative motion between the vehicle and the front object, the contact possibility warning unit providing a contact possibility warning by changing at least one of the driving force and braking force of the vehicle according to the contact possibility;

driver intention detecting means for detecting a driving intention of a driver of the vehicle, the driver intention detector detecting at least a driving intention of the driver that the driver is driving the vehicle in recognition that the possibility of the vehicle contacting the front object is increasing; and

warning controlling means for changing the timing of providing the contact possibility warning according to a detection result provided by the driver intention detector.

19. A warning method for a vehicle, comprising:

determining a contact possibility of the vehicle contacting with an object that is present in front of the vehicle according to relative motion between the vehicle and the front object;

detecting a driving intention of a driver of the vehicle, to detect at least a driving intention of the driver that the driver is driving the vehicle in recognition that the possibility of the vehicle contacting the front object is increasing;

calculating, according to the contact possibility, a control value to change at least one of the driving force and braking force of the vehicle; and

changing the control value according to a result of the detecting a driving intention.